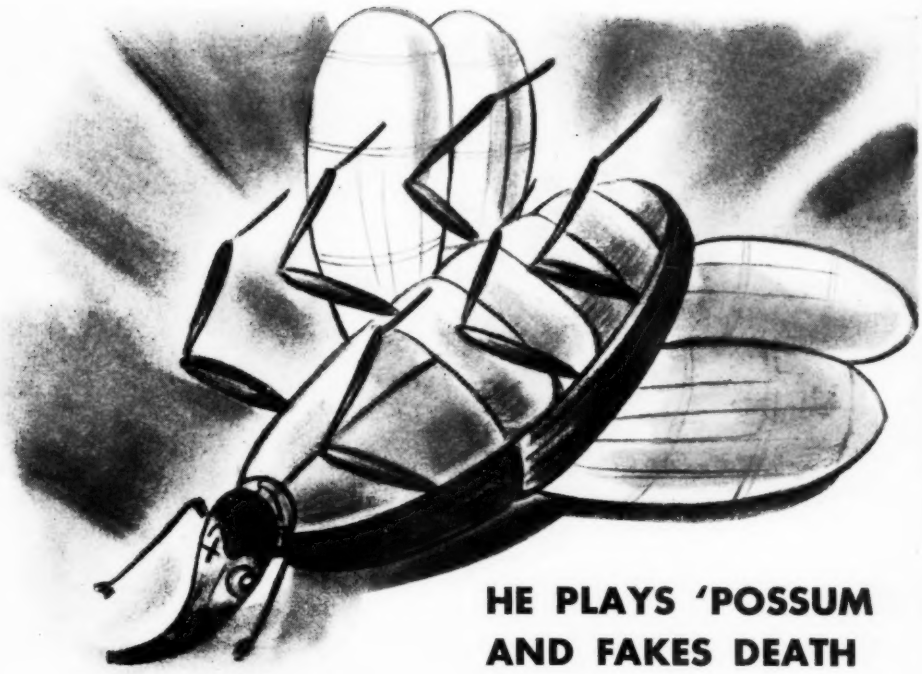
Pests

AND THEIR CONTROL

1943
SEPTEMBER
VOL. 11 NO. 9

ORGAN OF THE PEST CONTROL INDUSTRY

Exterminators
Fumigators
Termite Control Operators
Entomologists
Insecticide and Supply Mfgrs.



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STATEMENT

The National Association appreciates the co-operation given by way of publicity. The Association is not responsible for articles published unless credited to the Association. The list of officers and directors is published for informational purposes only.

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CONTENTS

"Contributed articles in this publication do not necessarily reflect the opinions of the editors. The editors invite discussions, comments and all types of literary material pertaining to pest control and pests from any person interested in the advancement of the field."

Editorial 4-5

Notes on Commensal Rats 6
By Ernst Schwarz

Pest Control: a Wartime Necessity Themes War Emergency Meeting and Eleventh Annual Business Session of the National Pest Control Association, Inc., Hotel Statler, St. Louis, Mo., October 25, 26 and 27, 1943 7

Half a Century with the Successful Argentine Ant 8
By Arnold Mallis

Fumigation with Methyl Bromide 14
Prepared by G. A. Dean and R. T. Cotton

Additional Patents Relating to Pest Control 18
By Dr. R. C. Roark

What's New in Pest Control—Personals 19

Directions for Destroying House Mice 21
Prepared in the Division of Predator and Rodent Control, Chicago, Ill.

Local Organization News 23

Write for These Booklets 26

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EDITORIAL

George E. Sanders Dies

Just as we were going to press the sad news reached us that George E. Sanders, long a member of the Industry and owner-operator of the Sanders Exterminating Co., Richmond Hill, N. Y., passed away on August 19th. A more detailed account of Mr. Sanders active and interesting career will appear in the October issue.—Ed.

Dr. C. E. Ladd

Dr. C. E. Ladd, prominent in agricultural research and education, died July 23 at the age of 55. Doctor Ladd has been Dean of the School of Agriculture, Cornell University, for the past ten years.

"Confidential Service"—"No Sign On Cars"

WE have come a long way—though not all the way—from the time—and not so long ago, at that—when such diseases as gonorrhea, syphilis and cancer were never—well, hardly ever—mentioned above a whisper in polite society, and the press, catering to the modes of the time, fumigated, perfumed and buried such items inconspicuously in its columns, if it published them at all. Because it was definitely in the public interest to counteract this, progressive and far-seeing public health officials, medical societies and the medical profession embarked upon a public educational program, with the result that today we have a better sense of values about such matters and a safer public to boot.

Therefrom two inferences of analogous interest to the PCO emerge: (1) that a conditioned or hidebound attitude can be reconditioned, given an intelligent approach; and (2) that this reconditioned attitude need not be, and rarely is, a spontaneous process on the part of the public; rather, it is a form of combustion generated by interested sources, in the indicated instance, by the medical profession and its organized constituents.

No use kidding ourselves, there is an existent public timidity and reticence with respect to commercial pest control. Though by no means universal, and growing even less so, this lack of public candor, nevertheless, still presents a formidable mental hedgehog, or resistance point, blocking the road to accelerated pest control service sales. For the PCO, in the face of this, to advertise "Confidential Service"—"No Sign on Cars," in the belief that that is the way to increased sales, is a mistake, albeit an honest one. To persist in this wise can serve only to foster, underline and encourage the very attitude which must first be overcome if the PCO is to move ahead on the sales front.

Moreover, to relegate the science of pest control to what is tantamount to a bookleg status is to do it and the PCO an injustice—nor, for that mater, is it in the public interest either.

It has been estimated, by well-informed souces, that there are thousands of homes and commercial buildings all over the country which are, and have been, pest infested,—some for as long as half a century. It has been further estimated that more than a majority of the owners, at present, have the effective means to pay for pest control services, once they are convinced that it is possible to be rid entirely of the pests; but there is no surer way to embarrass these owners and retard their development into actual service clients than to stress that such services are confidential.

There's no more reason, really, for the PCO to advertise: "Confidential Service," "No Signs on Service Cars" than there is for the doctor to assure his patients that their confidence will not be betrayed. That is implicit in all such relationships, including those of the PCO.

If the PCO wishes to enhance his professional status, move constructively in the direction of enlarged service sales, he should give thought to the elimination of such harmful advertising cliches, including, and especially, the one "No Colored Employees," or its more familiar converse, "Only White Men Used." This is, however, only the essential first step in the process of inculcating and cultivating a more realistic attitude on the part of the public relative to commercial pest control.

To illustrate: If one is not embarrassed when purchasing a cake of soap, a bottle of shampoo or a bottle of "Flit," since it is no secret that they are used either to chase dirt or insect pests, then why, in the name of common sense, should there be any more reason for embarrassment in the purchase of structural pest control services—services so esential to public health and morale? There certainly is none in the horticultural field. At this point we should like to rise and ask a hypothetical question: All needs being relative, who, if confronted with a choice between no more soap or a pest-free home, wouldn't choose the latter? We know what the answer would be on Guadalcanal, where first things come first.

Which isn't to say that we are not cognizant of the fact that, more often than not, there is a wide gap between "what is" and "what should be." But the PCO can help bridge that gap if he elects, for logic, common sense and the public interest are on his side. One thing and only one is the answer: A better enlightened public.

That the Industry has been and is employing the essential means to this desired end is a matter of record. One need only recall to mind the superb booklet "PESTS and PEOPLE", issued by the NPCA (still available for distribution), the various educational booth exhibits chartered by the Association as well as by individual PCOs at their own expense, the genuinely educational and informative literature distributed by a constantly increasing number of PCOs, the entertaining and instructive motion pictures apropos pests and pest control, and by no means least, the almost continuous co-operation between PCOs and public health departments, to say nothing of other government bureaus. In some a good start has been made, but only a start.

The press, too, has shown a commendable and helpful attitude towards breaking down public reserve with regard to essential pest control, especially since the needs of the war effort have highlighted its importance. Much more might be done by and through this important source if the requisite material were made available.

In summary: Just as it has been possible for the medical profession to transform deep-rooted public embarrassment, secrecy and hush-hush with respect to venereal disease, so the pest control profession can similarly reorientate like public attitudes with respect to its own activities,—activities generally conceded to be in the public interest. Doubtless, in time, it can be done, but only and only if the PCO reorientates his own thinking first and then implements it as exemplified by a highly successful, mid-western operator, long in the van of improved industry-public relations, whose remarks follow:

". . . The purpose of our business is to keep peoples' homes and places of business free of vermin and rodents. For the past four or five years, I have been trying to get new customers to take pride in the fact that they are using pest control service to keep their homes and places of business free of pests. We plan to continue to do so until we actually convince the people and they will be proud enough to display a sign telling the public about it. After all, if it is not an asset to a restaurant, food market or a hotel to have our service, why have it? If our service is important enough to pay from five to twenty dollars a month, why should they be ashamed of it?

"In my opinion, the PCOs should make every effort to give the best of service so that the customer will be proud instead of embarrassed."

It is to be hoped, too, that the PCO will re-examine his advertising policy and (where necessary) eliminate any statements which emphasize that his pest control services are confidential, that there are no tell-tale signs on service cars or anything of like import.

Buffalo, N. Y. Groups Spur Drive For Rat-Control Project

THE CITY OF BUFFALO has a serious rat problem on its hands,—has had one now for a number of years. Local politicians, for reasons of their own, have been reluctant to do much about it. Fed up with political piddling, public-spirited groups are moving to forestall this growing menace to health and property. Spearheaded by the newspapers, they have plumped for an all-out plan of control, one which would: (1) be continual not spasmodic, (2) be under the direct, active supervision or advisory council of such agencies, among others, as the public health department, the U. S. Fish & Wildlife Service, the Erie County Medical Society and the pest control industry, (3) include participation by all segments of the population, from householder to business man, in Buffalo's urban, suburban and rural areas. Result: it now appears a full-fledged rat-control project is a distinct possibility.

Mirroring and reflecting the kind of thinking and activity going on up Buffalo way these days, with respect to a city-wide rat project, are these excerpts culled from the columns of the local press.

Quoting verbatim a compilation based on a 23-year history of the campaign against rats in Buffalo researched by W. Scott Kendrick, chairman of Buffalo's War Council Victory Garden Committee, the "Buffalo Evening News" headlines it thus: "Much Said But Little Done About City's Rat Population." Mr. Kendrick, in upbuilding his case, notes the article, "has thumbed through newspaper files since 1920 and finds a startling similarity over the years to the approach to a solution to the problem and that the campaigns, though promised, never were carried out to any extent with the result that there are just as many, if not more rats in the ciy now as there ever were." The idea being, apparenly (according to Mr. Kendrick) "to get out the same statements every year and let it go at that."

Mr. Kendrick, who is, apparently, not one to take no for an answer once he has established his facts, has been a prime mover in activating the current publicity program to arouse Buffalo's populace and officialdom as to their joint responsibility to control the rat menace.

Editorializes the Buffalo Courier-Express: "City, village and town officials might as well agree that the war against rats is all one war, and that localized campaigns, however, masterfully conceived and strategically carried out, will not bring final victory. No territory as highly populated as Erie County can remain half rat-ridden and half free."

Reports George A. Laird in the "Buffalo Evening News": "The Public Health Committee of the Erie County Medical Society is planning to place its resources behind a program for a continuing rat-control drive." And adds Mr. Laird: "Dr. Kohl, chairman of the committee, is opposed to any short-lived campaign, since so many 'campaigns' have been conducted without tangible results that it is apparent rat-control projects must be city or area-wide in scope and on a continuing basis." Continuing further Mr. Laird says: "Dr. Kohl's attitude is similar to that of the National Pest Control Association, which wrote the "Buffalo Evening News" that "in our estimation, the basic fault with the approach to rodent-control has been an over-zealous attitude to emphasize from time to time what appears to us to be an opportunistic tangent or brief 'campaign' rather than viewing the problem in a more conclusive manner as an all year round project."

Mr. Laird concludes his article with a paragraph from a recent magazine article (reprinted in July, '43-Pests) by Dr. G. C. Sherrard, senior surgeon, United States Public Health Service, who, in suggesting a specific rodent-control plan for any city, says: "In order to insure the success of a plan of rodent control it is essential that the work be supervised by a thoroughly trained person. This person should have teaching and executive abilities and should be capable of assuming charge of personnel and all field activities."

Believing, and quite correctly, that the citizen can fight rats despite delay in public (rat control) program, Mr. Laird, in another article in the "News", urges him to ratproof, clear up rat harborages, keep garbage cans covered, etc.

On the basis of a survey he conducted on the methods used in other cities to eliminate the rat menace, Mr. Kendrick concludes, reports the "News" that "Rat control means continuous effort", and that "sporadic drives do no good."

Elaborating further on Mr. Kendrick's nation-wide survey, the "News" states: "St. Louis also has a permanent program, employing eight full-time exterminators in a control system mapped out in collaboration with the U. S. Fish & Wildlife Service, Predator and Rodent Control Service Division." Continues the article: "In Newark, N. J. the rat-control program has been a continuous effort for the last four years. At the outset posters were distributed pointing out that rats cost the City of Newark $1,000,000 a year, that rats contaminate food and spread plague, trichinosis, typhus fever, infectious jaundice, ratbite fever and other diseases."

A letter from Dr. Charles V. Craster, Newark public health officer, to Mr. Kendrick, quoted in the same article, reads: "Our regular force of sanitary inspectors enforces the terms of our ordinances in addition to two especially trained inspectors in rodent control.

"Where rodent conditions are found, this department compels property owners to employ competent exterminators."

NOTES ON COMMENSAL RATS

ERNST SCHWARZ
From the United States National Museum, Division of Mammals, Washington, D. C.

IN the course of a study on the origin, distribution and ecology of commensal rats a few facts have become apparent which, I believe, are important enough to be published even before the general account is completed.

1. Commensal Rats of North America

All the American literature dealing with rats, systematic, ecological, medical, considers three types of these animals: viz. the Norway rat (Rattus norvegicus Berkenhout), the Black rat (Rattus rattus rattus Linnaeus), and the Roof rat (Rattus rattus alexandrinus Geoffroy). This classification, apparently taken from Miller (1924), does not quite cover the facts. The true R. r. alexandrinus Geoffroy is not the animal usually referred to under this name. It has a brown back and grey belly, the two colors gradually passing into one anotherwithout any line of demarcation. The other animal, usually referred to as alexandrinus, has a brown back also, but the underside white or lemon yellow and sharply set off from the back. The name of this form is Rattus rattus frugivorus Rafinesque.

R. a. rattus and R. r. alexandrinus are primarily house-rats. The first has a more northern range and is largely replaced in the southern states by the second. Both forms are comparatively rare in the United States, because they are widely driven out by the Norway rat which competes with them. However, the white-bellied R. r. frugivorus is primarily an outdoor rat that lives not close to man although it will go into barns and occasionally into houses in the winter or when the outdoor supply of food becomes scarce.

It is thus obvious that we have four, not three, forms of commensal rats in the United States. For practical purposes the following English names are proposed: (1) Norway rat (norvegicus), (2) Black rat (rattus), (3) Grey-bellied rat alexandrinus), and 4) White-bellied rat (frugivorus).

Control measures, as advocated by the offical pamphlet of the Fish and Wildlife Service (Silver and Garlough, 1941), will be effective against the Norway rat primarily, and also against the Black and Grey-bellied rats. But they will not infrequently miss the White-bellied rat. This has become quite evident in the West Indies where the introduction of the mongoose has effectively controlled the Norway, Black and Grey-bellied rats, but not the White-bellied rat, which naturally has a tendency to nest in trees.

2. Rats and Plague

Introduced rats of the Rattus rattus type occur in various parts of East Africa. Their range is not continuous. As a rule the major routes of invasion can be reconstructed. Of these the most important one is that which goes along the Nile valley as far as Lake Victoria, and from there spreads south and west as far as Lake Tanganyika and the eastern part of the Ituri forest. All the rats in this area are about the same type as the Grey-bellied rat of Egypt, R. r. alexandrinus Geoffroy (syn. kijabius Allen), and are derived from it. Since the Uganda railway was built, these rats were carried towards the coast; I have examined specimens from Moshi, Mount Kilimanjaro and from Chamgamwe, near Mombasa.

In addition to that rats of Indian type have been introduced from the coast (Schwarz, 1934). With the material before me at the present time I am able to identify as R. r. kandiyanus Kelaart (syn. wroughtoni Hinton) rats from Nakuru, where they are the prevalent type, and from Kisumu. These rats are more reddish than alexandrinus, have a whitish, buffy, or very light greyish belly, and pale feet; their ears are short, and their bullae very small. Obviously these rats have come up-country with the Uganda railway; their occurrence inland is still rather local, and their number relatively limited.

In comparing the occurrence of these rats with the local outbreaks of plague among humans, the fact emerges that wherever such epidemics occurred, rats of the commensal type can be shown to be common.

It is known that the wild rodent population in East Africa (Gilks 1931, van Riel and Mol 1939), as in South Africa (Thornton 1936, 1938, Cluver 1939) and Egypt (Petrie and Todd 1923), becomes infected with plague to a considerable extent. But it appears that in Africa the major outbreaks of plague in human populations are found where infestation with commensal rats exists. This does not mean that transmission of the infection to man directly from the wild rodents does not occur; but, except in pneumonic plague, these cases remain more or less isolated.

3. Identification of Ship-Rats

I have come across three rats in the collection of the U. S. National Museum which appear to be of unusual interest. Trapped by W. Palmer in 1909 on board of the S.S. Lai Sang enroute between Hongkong and Singapore they can be positively identified as the Japanese house-rat Rattus rattus tanezumi Temminck. This form belongs to the group of Southeast Asiatic commensal rats which also includes R. r. diardii Jentink originally developed in Java, but now widely distributed all over the Malay countries and islands, and R. r. flavipectus Milne-Edwards of South China. Rats of this section of R. rattus are characterized by the cinnamon ground color, suffused or overlaid with black, and by the rather even, often bristly coat. The rats of the western group which includes R. r. frugivorus Rafinesque, R. r. alexandrinus Geoffroy, and R. r. rattus Linnaeus, found in the Middle East, the Mediterranean countries, and Europe, and carried to the Americas and Australia, have a paler, more or less tawny, ground color, suffused, overlaid, or covered with black, and a longer, sleek coat with long piles standing out.

R. r. tanezumi has the ground color of the back pale cinnamon suffused with black, the flanks tawny, the belly ochraceous hardly speckled with black and with dark slaty underfur, the feet pale buff with slight dark markings. The continental flavipectus has the back overlaid with black, the belly ochraceous tawny as a rule distinctly speckled, the feet all sepia, or white with heavy sepia markings in the metacarpal and metatarsal portion. R. r. flavipectus is altogether a darker animal than the Japanese form.

It is frequently held that ship rats cannot be identified satisfactorily. The case in question clearly points to the contrary. Its practical impor-

(Continued on Page 13)

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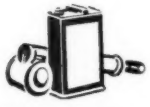

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Pest Control: A Wartime Necessity Themes War Emergency Meeting and Eleventh Annual Business Session of the National Pest Control Association, Inc., Hotel Statler, St. Louis, Mo., October 25, 26 and 27, 1943

OVERRIDING all other considerations in the minds of Morton S. Prescott, General Chairman, and those assisting him, in planning the program for the War Emergency Meeting was the war, its essential pest control requirements, and, most of all, under what circumstances and how specifically the PCO and his personnel could best perform these important services in a satisfactory and efficient manner. Keeping these needs in view the able and diligent planning committee decided to centralize all discussions around these basic problems:

(A) Solution of insect and rodent problems confronting armed forces at home and abroad
(B) Protection of the Public Health
(C) Conservation of Food and Other Vital Stores

Sessions, for the most part, will be limited to one or two themes each. The government, university and industry speakers on the program, all specialists in their respective spheres, intend to be brief but will also aim to provoke discussion from the floor. This arrangement should allow ample time for interchange of ideas and work-a-day experiences not only among the PCOs themselves but also with the speakers. It is confidently believed that this method of approach will assure individuals in attendance the greatest amount of benefit.

There will be no booth exhibits this year. The ladies are, of course, welcome as always, though entertainment will be reduced to a minimum. Sessions, it is expected, start early and even run into the evening. Comments of what you would like to have amplified during the sessions are welcome.

A tentative, and still incomplete, program has been announced by the NPCA as part of its Service Letter No. 301. That an outstanding program is in prospect may be gleaned from the names of some of the speakers and the topics they will discuss. These will follow in a moment. Before they do we should, however, like to make it clear that there are in addition other speakers scheduled of equal importance and authority, not mentioned here. On the other hand, all names mentioned herein represent assurances of promised participation, unless the priorities of the war interpose. Complete program will be published in our October issue.

Monday, October 25, opening day, will find D. P. N. Annand speaking on "Wartime Program of the Bureau of Entomology and Plant Quarantine". Prof. J. J. Davis will preside when the theme "Pest Control and the War Effort" is discussed. Lt. Col. F. C. Martensen will talk on "Pest Control and the Armed Forces"; W. O. Buettner will speak on "Wartime Problems of the PCO"; and Dr. F. L. Campbell will be heard on "Substitutes for Critical Insecticides." A "Round Table Discussion" will also take place Monday evening, with such subjects as "Manpower," "Rationing", "Government Forms and Questionnaires", etc.. on the agenda.

Tuesday's sessions will be devoted to "Rodent Control" and "Fumigation". Some of the speakers and topics will include: Dorr D. Green, "The U. S. Fish & Wildlife Service Brings Us Up to Date"; Galen C. Oderkirk and Walter S. McCloud, "Co-operative Experiment—Chicago, Ill." John B. Edwards will discuss "Legal Aspects of Pest Control" at the luncheon recess. Dr. R. T. Cotton will speak on "Fumigation in Relation to Conservation of Food"; Dr. George H. Chapman and J. Carl Dawson on "Fumigation for the Armed Forces"; while C. A. Vincent-Daviss and

(Continued on Page 18)

Half A Century With The Successful Argentine Ant

By ARNOLD MALLIS

Entomologist, Grounds and Buildings Department, University of California at Los Angeles

ON one fine day, fifty years ago, Ed Foster,[1] journalist and amateur entomologist, while leisurely collecting Hymenoptera, made a mental note of an innocuous-appearing brown ant. Foster, on this eventful day, devoted his entomological talents to that section of New Orleans where the coffee ships from Brazil were docked. It was not until some twenty years later, and only after the ant had become the housewife's nemesis, the gardner's grief and the orchardist's plague that he recorded his first glimpse of what is now our most prominent ant pest, namely, the Argentine ant.[2]

This insect undoubtedly was present some years prior to Foster's observation, but it only came into the public's eye with the turn of the century. The alarmed populace of New Orleans christened it the "New Orleans" ant. Newell,[3] deeming this to be a dubious honor for the Crescent City, shortly designated it the "Argentine" ant due to the fact that the species was described from workers collected in Buenos Aires, Argentina. Since the coffee ships that conveyed the ants to the docks of New Orleans came from Brazil, never from the Argentine, and since the insect was better known in Brazil, probably its native habitat, he might have called it more appropriately the "Brazilian" ant.

This most successful insect is now established throughout the southern states and in California. Isolated infestations have been reported from Arizona, Missouri, Illinois, Maryland, Oregon and Washington. It is also known from Portugal, the Union of South Africa, France, Australia and from many islands.

Injurious Aspects of Argentine Ant

The Argentine ant is one of the most important as well as one of the most common household pests in the wide area over which it is distributed. For example, in those sections of southern California where the insect is prevalent, practically every housewife utilizes some measure to combat it. In homes where its control is neglected, hordes of this persistent creature with its ever-present trails may be found in practically any food of a sweetish nature. It is an extremely persistent pest, especially so during the warm summer months. In the winter, immediately after the rains, it may invade the home in protection from the inclement weather.

That the Argentine ant was a most serious household pest in New Orleans may well be realized when we peruse Newell's remarks anent this ant:

> The species does not sting, but can bite severely when so inclined, and sometimes becomes an annoyance to human beings. I have known of several cases where people have had to place their beds, during the summer months, upon panes of glass covered with vaseline in order to pass the night in peace. There have been rumored cases of infants being killed by these ants, but so extreme a case has not come within my observations. That such might easily occur is not at all improbable.

Barber[4] was given this rather graphic description of the attack of the ants on a 4-weeks-old baby:

> "We were awakened in the night by a weak cry from the baby, and when the light was turned on the baby's face was black with ants. They were in the baby's nose, ears and mouth. We hurriedly carried the baby to the bathtub and started to wash off the ants. It took us nearly an hour and a half to get the last ant off the baby. I feel sure that if we had not heard the cry, in a few hours the child would have perished."

Some twenty years later, Lyle[5] further indicts this insect with the following notation:

> Negroes in some of the badly infested towns in Mississippi, long since accustomed to eating ants in all their food, seek partial relief while sleeping by stuffing cotton in their ears. Sleeping children with cuts on their bodies suffer especially from their attacks. The possibility of spreading typhoid fever or other diseases is indicated by their attendance on human feces in outdoor privies.

The farmer is another victim of the ant's depredations. Newell, who made the first and still most comprehensive studies of the Argentine ant, conjured a skin-creeping specter when he stated that the ant would be as bad a pest as the San Jose scale, the gipsy moth and the cotton boll weevil. Thanks to the entomologist, this dire prognostication has never been realized. In the citrus orchards of Louisiana, some thirty-five years ago, the ant was incriminated for eating the buds on the trees and thereby ruining the yield. Fig crops were likewise damaged. Moreover, this hexapod fostered aphids, mealy bugs and scale insects on plants so that they increased enormously in numbers, and then these injurious insects would have the plants in a most serious way. The Argentine ant was an especially prominent pest in the citrus orchards and sugar-cane fields in Louisiana.

Beneficial Aspects of the Ant

The Argentine ant has a few virtues, but these hardly compensate for its numerous vices. It is, above all else, an important scavenger of dead and dying insects. In the homes of the poor in New Orleans, it has played the role of Robin Hood by exterminating bedbugs and other vermin. The sorghum midge and other injurious insects are very often victims of its appetite. On a day in spring when the western subterranean termite conspires to populate the earth with house-consuming insects, the ant may be observed bearing the winged termite to some subterranean festive board. The ant apparently has little success against the termites when they are ensconced in their earthen tubes.

Food of the Argentine Ant

The Argentine ant has a decided "sweet tooth" which it does not hesitate to reveal when in the presence of sugars, syrups, fruit juices and materials of a like nature. It feeds with great avidity on the floral and extrafloral secretions of plants and consumes with gusto the honeydew excreted by aphids, mealybugs, scale insects, etc. Meat, especially that of other insects, is at times very attractive to it, and often one may see the ant in great numbers on a fresh bone abandoned by a dog. In Berkeley, California, the insect often invaded the university hospital and fed on blood smears. It is also recorded feeding on cereal products, especially on corn meal.

When once on the trail of food, the ant is extremely persistent. It raids refrigerators with the same abandon as any member of the family and, like Eliza in "Uncle Tom's Cabin," will even cross ice to attain its objective. The ant has been observed to drop

from the ceiling on a table which had its legs wrapped in cloths soaked with coal oil, and has entered tightly screwed Mason jars, lacking in a rubber gasket, by following the spiral thread between the cover and the glass.

There are certain plants which are almost certain to attract myriads of this insect, and the ants, at times, will be found ascending these plants in trails that are several inches wide. Cherry laurel is one of the "ant-plants," and the Argentine ant fondly feeds on the secretions from the nectaries on the leaves. During the summer months when the insect ascends this plant, it will not be turned aside by the most seductive of baits. Fig trees, with their fresh figs, are an ant heaven and bamboo, many species of pine, as well as numerous other plants infested with aphids and other Homopterous insects, constantly shower the hungry emmet with their "manna."

The harassed housewife is apt to attribute certain occult powers to this insect, so quickly does it locate food in the home. The ant accomplishes this feat despite relatively poor eyesight, and a sense of smell rather limited in range, so that it practically "bumps" into the nourishment before discovering it. To explain this, we need not travel into the realm of legerdemain. Newell and Barber[6] found that the ant can travel 29 inches a minute or 145 feet in an hour, and thus the scouts who forage day and night, and patrol every square inch of an infested area, are bound to contact some stray victual. They thereupon report the gastronomical bonanza to the home base, and the characteristic safari of ants ensues. In hot weather the rate of locomotion of the ant, as with other insects, is greatly accelerated, and it finds its food with even greater alacrity.

Relationship to Honeydew-secreting Insects

The economic entomologist is greatly interested in the Argentine ant because of its habit of fostering and protecting injurious insects on plants. Horton[7] clarified the relationship between the Argentine ant and a typical honeydew-secreting insect, the injurious black scale. He states:

> The ant approaches a mature or immature but settled insect and strokes the body with one antenna after the other, rapidly and rhythmically. If no liquid appears after 15 or 20 strokes, the ant usually passes to another scale or rests motionless by the first. Unless the scales are very numerous a proportion of the ants always are waiting, and the principal function of the small shelter structures found over scale groups is believed to be to protect the waiting ants from light, breezes, and sometimes, the too copiously falling honey dew and its attendant mold. When the scale is ready to excrete the anal plates open slowly outward and from between them is extruded a tubular organ, at the extremity of which appears a droplet of colorless fluid. This the ant takes and swallows at once. The tube is then retracted and the anal plates close. The whole operation requires only a few seconds, not allowing time for closer examination of the mechanism.

Horton noted that the process was somewhat similar in the mealybugs, that the ants destroyed but a negligible number of orange blossoms, that it did not disseminate the living scales, that it prevented parasites and predators of the scales from functioning, and thus intensified the effect of these injurious insects on the tree. He then concluded that as a whole the ant was not too important in citrus orchards in the building up of scale population, but was of some importance in spreading plant diseases on trees.

Students of insects have had proof for many years that ants may carry aphis and other homopterous insects on to plants and aid them in becoming established there. There is a difference of opinion amongst entomologists as to whether or not the Argentine ant actually carries scale insects on

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to the plant. Horton, as was previously mentioned, definitely stated that the Argentine ant did not disseminate the black scale. Newell and Barber came to a different conclusion, as the following observation will indicate:

During March, 1910, a considerable number of adult female scale insects were found embedded in a band of "tree sticky" placed around a magnolia tree to repel the ants. The band was located 4 feet from the ground. The scale insects were a species of **Odonaspis** which is found upon Bermuda grass close to the surface of the ground. There was apparently no other way for the insects to get up the tree except through the transporting agencies of the ants.

Relationship of the Argentine Ant to Other Ants

The Argentine ant, Genghis Khan of the emmet world, is intolerant of other species in any area it has overrun. Due to its aggressiveness, its unrelenting persistence in the attack, and especially to its superior numbers, this insect soon overcomes even the largest ant. It does not hesitate to attack the fire ant and the agricultural ant, even though they are armed with fiery stings. When the Argentine ants attack ants many times their size, they attach themselves to the appendages of their unfortunate victims; peg them out, drawing their appendages as taut as fiddle strings. Thereupon they mount the unfortunate and securely held ant; bite off its antennae, and later decapitate it.

Woodworth[8] studied the wars between the Argentine ant and its arch enemy, the odorous house ant, **Tapinoma sessile** Say. He made some interesting observations on its battles with the Argentine ant, in which he noticed that the odor

is produced by a liquid secretion (speaking of the ejection from the anal glands) which can be ejected from the abdomen as an appreciable drop, and which is used in its contests with the Argentine species. As long as the supply of the secretion lasts the **Tapinoma** has no difficulty in keeping the Argentine ant off, but after having put four or five Argentines out of the combat in this way finally the **Tapinoma** is put to rout and the Argentines are invariably victorious, because they always attack in sufficient numbers. We have observed many battles between these species and the **Tapinoma** is always driven away from its feeding ground and its home despoiled.

This insect has no important natural enemies in the United States, but at times it has had some interesting contests with variable results against army ants.

Since the insect will not tolerate any sick or dying ant in the nest, there can be but little hope of natural control through artificially disseminated diseases caused by virus, bacteria, protozoa, fungi, etc.

Description of the Various Casts

It may not be amiss at this point to describe with a little more accuracy the villainness of this piece. The worker or sterile female is 2.2 to 2.8 mm long, but it may appear larger when the abdomen is extended with food. In color it varies from a light to a dark brown, with the thorax, scapes and legs somewhat lighter. The mandibles are yellowish and dentate. Often, when the worker is descending from a tree, the abdomen will appear honey-colored, due to distention of the abdomen by liquid nourishment. The worker, as its name implies, does all the work, such as excavating the nest, obtaining food, feeding the young, protecting the colony and annoying the homeowner.

The brownish queen is from 4 to 6 mm in length, and is by far the largest ant in the colony. There is usually a number of queens in one colony. One may readily demonstrate this by merely pouring a milk-bottle full of water onto a nesting site; within a short time the workers with young in their mandibles, and very often a number of queens, will emerge. Since a colony may consist of a maize of trails ramifying throughout an extensive area, the queens may number in the hundreds.

Newell found the winged queen on rare occasions in an outdoor nest in Louisiana and encountered the alate female much more frequently in artificial nests. It was his opinion that the queen mates in the nest, making wings unnecessary. The author has yet to find a winged queen in California.

Hertzer[9] notes that the queen is not a mere egg-laying machine, but takes an active part in the feeding and grooming of the young. Moreover, in this highly successful species, the queen feeds and cleans herself.

The winged male is a small-headed, big-chested nonentity who shortly after mating departs from this vale of tears. Like other gentlemen we know, he is very fond of bright lights on warm summer nights.

Nests of the Argentine Ant

The Argentine ant has a vertical distribution from sea level to approximately 4,000 feet. Throughout its range it will be found nesting wherever there is a suitable amount of moisture in the soil, where light is excluded and where the food supply is in close proximity.

In the spring of the year the nest will often be found in open ground with small piles of excavated earth but a short distance from the nest holes. Form boards along walks, and in fact, wooden objects of any kind are preferred as nesting sites and permanent runways, as are cracks and crevices in concrete walks. The area beneath a plant infested with "ant cows" will often be honeycombed with their tunnels. The ants may be encountered in enormous numbers in and under dead and decaying stumps. During warm weather they are partial to the underarea of houses and may use the mudsills as their runways. The nest may even be established in the house proper. The queen and her following of neuters have been observed to invade the second floor of a house and to establish themselves beneath a damp rag on a kitchen sink.

The nests during the summer are usually very shallow, but 1 or 2 inches beneath the surface; on one occasion a nest was found about the roots of a tree, situated on a slope, that was more than 12 inches in depth.

In the autumn the insects aggregate into a virtual ant metropolis in which there are hundred of queens. The huge nests may be found beneath boards, sheets of tin, buildings, etc., as well as in accumulations of dead plant material with its attendant heat of decay. The author has found the Argentine ant over-wintering in enormous numbers in tunnels containing hot conduit pipes. Smith[10] noted that in northern localities this hexapod may become established in buildings, and spread from edifice to edifice, thereby avoiding the cold of winter. With the coming of spring, these colonies break up into smaller affairs consisting of one to several queens with a large number of workers all of whom migrate and establish themselves elsewhere. In fact, during the spring and summer months, an individual queen may take a stroll in the open, and upon acquiring a retinue of workers, establish her own colony.

Means of Spreading

The Argentine ant has been distributed, mainly, by "riding the rails" in products of all kinds to widely separated parts of the country. Its spread by crawling is rather slow, and Smith found this natural spread to be a few hundred feet per year. It is often introduced into hitherto uninfested areas in balled nursery stock.

That water may also serve as a transporting medium is noted by Barber, who is quoted as follows:

Lumber, rotting trees, unrooted shrubs, cane growth, fruit vegetables and all manner of refuse contribute to the mass of matter borne on the crest of flood water, and in this the ants seek refuge and are involuntarily transported. Nature has endowed this species with a remarkable habit

of self-preservation from drowning in times of floods, for when rising water floods their nests and no other means of escape are presented they cluster together and form a compact ball. The immature stages form the center of this ball, with the queens and workers as the outer portion. As the ball enlarges from the addition of other workers which have been struggling alone in the water it gradually revolves. It is kept revolving slowly by the outside workers continually striving to reach the top of the ball, thus permitting air to reach the interior. The writer has had only one opportunity of witnessing the formation of a ball of this kind. After a 5-inch rainfall several balls, none more than 2 inches in diameter, were observed. According to reliable authorities, such balls have been observed on many occasions, some of them from 6 to 8 inches in diameter. The ants in these balls disperse when they come in contact with a secure resting place, such as a floating piece of timber or land, but they have been seen to float around for hours on still water.

Steamboats and driftwood in flood waters were particularly responsible in distributing the ants along waterways in the southern states.

The Argentine Ant and Its Environment

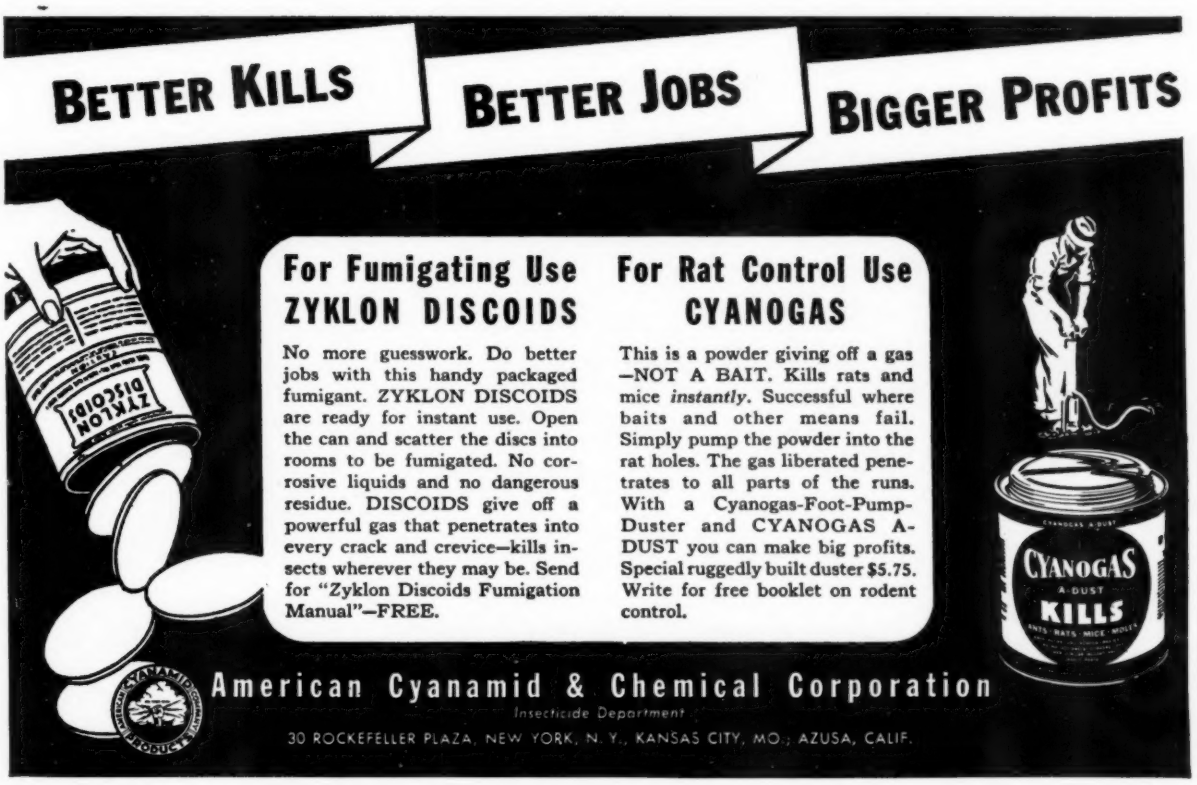
One of the most important limiting factors in the distribution of this species is the amount of moisture in the soil. The effect of a relative absence of soil moisture is very noticeable in the arid parts of the interior valleys of California, especially in the vicinity of Bakersfield, where the natural spread of the ant is very slow. Here one may observe the insect to be superabundant in and around the watered grounds of the home; yet, 2 or 3 feet away from this artificially moistened area, nests of the fire ant and of the agricultural ant are present, excellent proof that the Argentine ant is limited to the more humid soil. The immature stages are especially dependent upon a damp habitat.

Excessive soil moisture, on the other hand, caused, for example, by rains, will force the ants to seek shelter of some kind. Titus[11] noted that during wet weather in Louisiana, the ants constructed nests up in trees to which they had previously carried the immature forms. These nests were constructed with earth carried from the ground. Some of them were situated in forks of live oak trees, some 15 to 20 feet above the ground. The phenomenon of the ant carrying its whitish eggs, largae and pupae up a plant or the sides of a house is a daily occurrence when one waters a garden infested with it. As was previously noted, the ants are very resistant to drowning. Smith records an ant colony situated on a post that was submerged for 3 days; after the recession of the water, the colony was found apparently unharmed. There is a great mortality of the ants during the winter months when the ants are numb with cold, and thus unable to adapt themselves to conditions caused by excessive rainfall. Rain, moreover, prevents the worker from foraging for food.

One may observe this persistent creature to walk on a small surface of water, especially when the water has been standing for a time, and has accumulated some dust on the surface. It may alternately walk and swim across this surface.

The ant becomes most numerous and most troublesome during the summer months. The rapid increase in numbers during a short stretch of hot weather is nothing short of phenomenal. In cities such as Bakersfield and Sacramento, California, where the maximum temperatures may rise well over 100 degrees F. for days at a time, this moisture-loving ant lives in the damp earth on the north side of the home or under the house itself. On such hot days it makes a pest of itself by invading the house and foraging for moisture around the sink and bathtub.

The minimum temperature of our more northern localities is an important factor in confining the range of the Argentine ant. This to a great degree explains their absence from areas north of California and the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southern states, except for isolated infestations where they live in artificially heated buildings.

Although cold is a limiting factor in its distribution, this originally tropical ant is at times remarkably resistant to low temperatures. Smith found that in protected places it may move at temperatures as low as freezing. He further states that he

> once found in a rotten log, packets of workers that were thoroughly encrusted with ice and were so stiff and motionless as to give the appearance of being dead. The temperature the night before had been 13°. When a mass of the workers was taken to a laboratory, they thawed out in an hour or so, without any apparently ill effects, and became as active as ever.

The writer, on one morning when frost covered the ground in Berkeley, California, wondered what had happened to a colony of the Argentine ant that had been under observation. Preliminary probing of the soil revealed naught of the ants. Further digging resulted in the removal of a clod of mud which had interesting potentialities. The normal mud ball is naturally entirely inanimate; yet this one conveyed a distinct sensation of vitality, and closer examination revealed that this effect was due to the slow flagellate-like movement of many appendages. The mud ball was then broken open, and the appendages were revealed as the antennae of the ants, hundreds of whom were thoroughly encrusted in the mud. The antennae were the only appendages capable of being moved by the frigid ants. These soon thawed out.

Herbert,[12] on the other hand, found that the Argentine ant succumbs under artificial conditions of refrigeration if held for 24 hours at a temperature of 31° F. or in a shorter time if held at a lower temperature.

Air movements are quite a problem to the Argentine and other species of ants, and they will not be found foraging in open places on windy days. At these times they will seek shelter in protected places, such as under the loose bark of trees, beneath stones and in cracks and crevices.

According to Newell and Barber the ants become accustomed to loud noises and constant vibrations, and have been found "between and under the ties of railroad tracks over which many trains passed daily."

Many individuals have observed the seeming preference of the Argentine ant for electric outlets and switch boxes. Hackley[13] discovered large numbers of dead ants in household electrical outlets. When he turns off the current of the main switch the ants no longer came to the electrical baseboard outlet. When the current was turned on again, they came back. From this he concluded that the ants are attracted by the action of the electric current and are killed as a result. Is it possible that shelter and warmth may also be factors here?

History of the Control of the Argentine Ant

The evolution of the ubiquitous bottle of ant sirup or ant paste was indeed a tortuous one, and it may not be amiss to lift the veil of obscurity from those men who, if they did not make the world safe from the Argentine ant, at least helped keep them out of our homes.

The first methods of curbing this creature in the United States were rather crude, and consisted of banding the legs of furniture with tape soaked in corrosive sublimate, or using the still prevalent ant powders, or by trapping and fumigating the nests of the ants. These methods left much to be desired, and entomologists first began to settle the fate of the Argentine ant when they interested themselves in poison baits.

Arsenic is our best-known poison, and when ants were observed to feed

(Continued on Page 23)

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Notes on Commensal Rats

(Continued from Page 6)

tance is obvious. Rats are carriers of disease. If ship-borne rats can be correctly identified, an additional method becomes available to trace the origin of epidemics, and their routes of dispersal, in cases where other methods fail. It may be of immediate value in connection with the present war when ships, armies, and stores are moved indiscriminately.

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Failure to Fumigate House Results in $25 Fine

Because Valentine Harnisch of 44 Hertel Ave., neglected to fumigate a house he owns at 65 Bradley St. occupied by two families, he was fined $25 Friday by City Judge Clifford McLaughlin on a charge of violating a health ordinance. A body execution empowering a marshal to collect the fine was issued when Harnisch did not appear.

"The building is infested with bedbugs," said Health Inspector John V. Kane, who made five inspections between May 21 and June 25 and notified the owner of the condition. The owner appeared in court two weeks ago and was told by Chief Judge John D. Hillery to fumigate the premises.

—*Buffalo Evening News.*

THE NPCA WAR EMERGENCY MEETING AND THE SUPPLY HOUSE

On October 25, 26, 27 at the Hotel Statler in St. Louis, Mo., PCOs and their guests, from the U. S. and Canada, will meet in emergency war session under the auspices of the N.P.C.A.—the eleventh of its consecutive annual get-togethers. An extensive program, geared to problems of supply, control techniques, and, above all, the urgency of the war effort and the peace to follow, has been completed, and a good attendance is in prospect.

Per its custom, PESTS and their CONTROL, the Industry's journal, will devote the editorial contents of its October issue to advance publication of the War Emergency Meeting's program, together with related highlights. Because of this and other timely information of tangible war-winning value the issue will carry, it will be of more than passing editorial interest.

To implement the need for widest dissemination of the program details in advance of the Meeting itself, the October issue will be mailed to every PCO on PESTS' list, whether subscriber or not, and that means practically every known PCO in the U. S. and Canada, plus many insecticide manufacturers, supply houses, entomologists and others, all of whom will receive a copy, with extra distribution, for extra good measure, at the St. Louis meeting itself.

This raises the question: What does this all add up to for the supply-house advertiser? The answer is simply that it will make for an issue with a grand total of approximately double the circulation of any other single issue of the year, and one in which space can still be bought—believe it or not—at our regular, low, pre-war advertising rates—and that, in these days of rapidly mounting prices, is something.

That the supply house will find it a measure of good business to engage advertising space in this all-important October War Emergency Meeting issue is undeniable. With this in mind several copy thoughts suggest themselves: namely, the advertiser can (1) announce his regrets at the dearth of supplies and even, if necessary, his inability to take care of the PCO's complete requirements; (2) suggest possible control substitutes; (3) take this opportunity to wish the Industry well at its meeting; (4) insure that his sales story reaches his PCO prospects at a time when the question of supplies and supply sources is uppermost in their minds; and (5), above all, come what may, keep his name before the Industry.

This is the kind of a story that should be told now. It can be told, most effectively and most opportunely, through the October columns of PESTS and their CONTROL, the publication the PCO reads regularly and consults continually in the practice of his profession and the conduct of his business.

Whether the Industry supplier plans personal representation at the St. Louis meeting, as we hope is the case, or whether physical representation is impractical this year, making some other form of personal, on-the-spot contact more essential than ever, in either event, the industry supplier can do no better, we think, than to forward without delay (advertising forms close tight on October first) copy instructions for our October N.P.C.A. War Emergency Issue —an issue which, for all practical purposes, will have overall coverage of America's PCOs at the right time and at modest cost.

For further information (promptly and with pleasure!) write:

PESTS and their Control 512 E. 14th St., Kansas City, Mo. (6) or 126 Lexington Ave., N. Y. City (16)

N. B. Attention is also directed to the advertising value inherent in our November post "War Emergency Meeting" issue which will contain the complete story of events transpiring there and one which should have high reader interest not only for those PCOs who attended but also for those who, for one reason or another, did not.

Fumigation With Methyl Bromide

Insert for United States Department of Agriculture Circular 390, Flour-Mill Insects and Their Control

Prepared by G. A. DEAN *and* R. T. COTTON

METHYL bromide has been found highly efficient for the fumigation of modern, tightly constructed mills of concrete, stone, or brick. It is not recommended for use in mills built of wood, or of frame and sheet metal, owing to the difficulty of holding the vapors long enough to obtain a satisfactory kill.

Properties of Methyl Bromide

Methyl bromide is furnished as a liquid which boils at 40.1° F. At ordinary room temperature it is a colorless gas weighing 0.247 pound per cubic foot. It is obtainable commercially in 1-pound cans or in cylinders containing 10, 50, or 150 pounds net. The natural pressure of the gas is sufficient at room temperature to make both cans and cylinders self-emptying when opened. The pressure in the cylinders, however, is increased slightly by the manufacturers to facilitate the rapid removal of the fumigant.

Methyl bromide is relatively inexpensive at the dosages required for fumigation, highly toxic to all stages of insects, including their eggs, noninflammable at concentrations used in commercial practice, and can be used successfully at comparatively low temperatures. It has remarkable powers of penetration and is undoubtedly the most efficient fumigant known for the treatment of warehouses filled with bagged commodities. Lacking a distinctive color, this gas is but faintly noticeable in small quantities—a feature that creates a hazard that is not present with some of the rapidly toxic gases that possess distinctive warning properties.

All persons using methyl bromide as a fumigant and all persons engaged in unloading or removing fumigated materials from cars, sheds, or rooms in which commodities have been fumigated should be warned of the toxic properties of methyl bromide. The dangers from inhaling the gas and the absence of odor should be stressed. Although methyl bromide is less toxic to man than certain other fumigants, all persons fumigating with methyl bromide or mixtures containing methyl bromide, or persons entering fumigated rooms, cars, or sheds to open ventilators or to unload fumigated materials, should observe the same precautions as with other fumigating gases. The following precautionary measures are recommended in the use of methyl bromide as a fumigant:

1. Avoid breathing air containing methyl bromide by wearing a gas mask at all times when handling it outside of the original container.

2. Provide in advance for thorough ventilation of cars, rooms, or buildings after fumigation and before anyone enters them.

3. When necessary to enter spaces containing methyl bromide, use a gas mask provided with a canister giving protection against organic vapors, or a positive pressure-hose mask. (Masks and canisters to be approved under U. S. Bureau of Mines Schedules 14D or 19A. Canisters to be black, type B. Workers should be provided with these approved masks for use when necessary in handling this fumigant or commodities that have been fumigated with it. All mask canisters have a limited life period. For this reason special precautions should always be taken to see that masks are fitted with fresh or fully effective canisters.)

4. Avoid spilling methyl bromide. Go into the fresh air immediately in case of spillage. Remove any clothing which has become impregnated with the liquid.

5. Post signs warning that methyl bromide is being used and that the gas is poisonous.

6. Store containers of methyl bromide in a cool, well-ventilated place, well removed from any buildings in which people work or live. Avoid leakage by seeing that valves on cylinders are tightly closed.

Preparing the Mill

When preparing a mill for fumigation with methyl bromide, close the entire building as tightly as possible, tightly wedge and seal all windows and replace any broken panes, seal all loosely fitting window sashes with paste and paper or have them "puttied up" with a mixture of flour and oil, and seal all doors in a similar manner.

In addition—

1. Open all machines, conveyer boxes, and flour bins, and all repair openings to spouts, elevator legs, etc., and wedge open all feeder gates on rolls and purifiers.

2. Remove covers of all conveyers, making certain that all dead-end spaces are readily accessible.

3. Open dust collectors, back drafts, main trunks, and air-inlet regulators.

4. Remove all sifter doors to permit entrance of gas during fumigation; remove sieves and stack them on the floor.

5. Seal roof ventilators and replace mushroom-shaped caps with a tight metal cap.

6. Do not remove accumulations of stock from elevator boots or milling units.

Each floor, as far as practicable, should be treated as a separate unit, by closing doors between floors and to stair wells and freight elevators—although some interchange of gases will necessarily take place through the slide spout and elevator legs.

Methods of Applying the Gas

Methyl bromide can be applied through a piping system in much the same manner as described for liquid hydrocyanic acid, or by releasing the gas directly into the open space from cylinders placed at strategic points in the mill. Each cylinder of methyl bromide is equipped with a siphon tube so that it can be emptied without inverting the cylinder. A dosage of 1 pound per 1,000 cubic feet of space has been found adequate for the fumigation of all well-constructed mills.

If the gas is to be introduced into a mill through a piping system, the pressure in the cylinders should be increased with compressed air of 150 pounds. The cylinder or cylinders are then connected to the manifold of the piping system on the outside of the building. After the valve is opened the pressure forces the fumigant from the cylinder into the fumigation lines at the rate of about 10 pounds per minute. In cool weather the pressure in the cylinder must sometimes be built up with compressed air a second time to speed up the emptying of the cylinder and the application of the gas. A three-way connection between the cylinder, the manifold, and the air compressor will facilitate this operation. For large mills, where this method of applying the gas is best adapted, the 150-pound cylinders will be found most convenient.

Small mills without a piping system can be fumigated by distributing the

requisite number of cylinders uniformly over the several floors and releasing the gas by opening the valves. The smaller cylinders will be found most useful for the purpose and will enable the fumigator to distribute the gas uniformly over the building. One-pound cans can be used to supplement the dosage and are particularly useful for treating small rooms that are cut off from the regular mill space. Large portable fans operated on each floor of the mill for at least 1 hour after the gas is introduced insure a proper distribution of the gas.

In applying the gas, the fumigator must be careful not to expose himself to the concentrated vapors, and for his protection he should be supplied with a suitable gas mask as described previously. If the gas is applied from the outside of the building, a gas mask should be worn by the person connecting the cylinder to the manifold and operating the valves, to guard him against exposure to any leaking vapor. Where the cylinders are discharged directly into the open space of the mill, two men wearing gas masks should work together and should release the gas as rapidly as possible so that they will not be exposed to a heavy concentration of the fumigant even though they are protected by masks. The fumigation should begin at the top of the mill and should proceed downward from floor to floor, the operators opening the valves of the cylinders by hand and discharging any 1-pound cans required.

For the building, an exposure period of from 16 to 24 hours should be allowed, after which the mill may be opened up for aeration. The same precautions should be taken in ventilating the building as with hydrocyanic acid or other toxic gas. Workmen entering the building to open the windows and doors must wear gas masks of one of the types described on page 2.

Precautions must be taken to keep everybody out of the building while it is under fumigation, and all but masked workmen out while it is being aerated. Under all ordinary conditions a mill will air out rapidly after it is opened up.

Warehouse Fumigation

Observations indicate that in tight concrete or brick warehouses methyl bromide is an ideal fumigant for the treatment of bagged flour or feed. The same dosage recommended for mill fumigation is adequate unless the warehouse is heavily loaded. In such cases it may be necessary to increase the dosage to 2 to 3 pounds per 1,000 cubic feet of space. The gas should be applied in the same manner as recommended for the treatment of small mills, and the doors, windows, and ventilators should be sealed.

Atmospheric Vault or Vacuum Fumigation

For the fumigation of bagged flour, feed, or other milled cereals in vaults at atmospheric pressure, methyl bromide has been found highly effective. It should be used at a dosage of 1 pound for the first ton, plus 2 ounces for each aditional ton, with a minimum dosage of not less than 1 pound per 1,000 cubic feet of space. The fumigant is introduced from the outside of the vault through the wall by means of a ¼-inch (outside diameter) copper or plastic tube either from a cylinder or from 1-pound cans. The fumigant should be caught and allowed to evaporate in a metal pan fastened to the inner wall under the inlet tube near the top of the vault. If the vault is equipped with a fan for circulating the fumigant, it is desirable to operate it for at least an hour in order to insure a good distribution of the gas. After an exposure period of from 16 to 24 hours the vault, before being unloaded, should be aerated for approximately 1 hour by means of an exhaust fan. To avoid accidental exposure to the vapors of methyl bromide the operator should wear a gas mask equipped with a fresh, black canister designed to protect against organic vapors.

The dosage in full-loaded vacuum vaults should be 4 pounds per 1,000 cubic feet of space for 3 hours, or 3 pounds per 1,000 cubic feet for 15 hours. The pressure in the vacuum vault should first be reduced to 2 inches, after which the gas is introduced from a cylinder. If the vault is equipped with a recirculating system, the gas-air mixture in the vault should be recirculated for approximately 15 minutes. After the fumigation, the chamber should be air-

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washed twice before workmen are allowed to enter to unload the treated products. The air-washing is accomplished by alternately drawing and breaking a high vacuum. The same precautions should be taken in handling the fumigant as are suggested for atmospheric-vault fumigation.

Tarpaulin Fumization

If tight warehouses or fumigating vaults are not available, it is possible to fumigate stacks of bagged flour or feeds by the use of a tarpaulin of rubberized or plastic-treated canvas. The material to be fumigated is stacked to a height of 5 or 6 feet, allowing for complete coverage by the tarpaulin with a margin of about 2 feet on all sides. The edges of the tarpaulin should be weighted down carefully by a row of filled bags placed all around the stack so as to prevent leakage of the gas from around its base. Provision is made for an air dome on top of the stack by using two bags placed edgewise about 4 feet apart on top of the stack. This air dome will provide free space to permit downward diffusion of the gas, which is heavier than air. Methyl bromide is introduced into the tarpaulin-covered stack through a copper tube leading from the cylinder to the air dome. The dosage, which should be the same as recommended for vault fumigation, can be measured in by use of a special applicator attached to the cylinder, or weighed in by placing the cylinder on a scale platform. In some cases it may be found convenient to use 1-pound cans instead of a cylinder. A special can puncturer can be attached to the copper tube so that the proper number of cans required can be placed in the puncturing device, one at a time, and allowed to empty themselves through the tube.

This method of fumigation should not be conducted indoors, but only where there will be no danger of workmen being exposed to the fumes that might escape from the stack. An outdoor loading platform, pier, or similar unconfined space is preferable. At the expiration of a 16- to 24-hour fumigation period the tarpaulin should be partially pulled back from the fumigated material and the stack allowed to air for at least 30 minutes before the tarpaulin is entirely removed. Workmen performing the fumigation should be equipped with suitable gas masks as recommended for atmospheric vault fumigation.

Boxcar Fumigation

Railway boxcars loaded with flour or feed, arriving at destination in an infested condition, can be fumigated successfully with methyl bromide at a dosage of 12 pounds per car (about 4 pounds per 1,000 cubic feet). The doors should be tightly sealed with masking tape and the gas introduced from cylinders or 1-pound cans through a copper tube. After a 16-hour exposure to the fumigant the car should be opened and allowed to aerate for an hour or two before it is unloaded.

Watch Your Step

Ladders are part of the average Pest Control Operator's equipment—constantly being used for sealing up openings for fumigation, treating the siding for drywood termites, or, the setting of some rat-traps in the upper corners of the pantry shelves. However, statistics show that ladders are a definite hazard when considering household accidents. Here are five points to remember when using a ladder:

1. Use only ladders in good condition. Never use one with missing or broken rounds or steps.

2. In using ordinary rung ladders, place them only against solid and stationary objects.

3. The foot of the ladder should be one-fourth of the ladder's length away from the wall or object which it is leaning.

4. When climbing up and down a ladder, always face it—and use both hands.

5. Do not leave tools or other heavy articles on top of a stepladder—they might fall on your body or that of some passerby.

—*PCO News.*

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FOR ROACHES and RATS

J-O PASTE (Type "O"): Out of our 69 years experience, we offer this Phosphorous Paste to meet every need. Consider these five advantages: (1) Type "O" Paste remains soft for months after application; (2) It embodies an attractive lure for roaches and rats; (3) It does not form a hard shell, remains penetrable; (4) It is miscible with water in all proportions; (5) It is unexcelled for the large specie of roach (American, etc.) and many different types of pest control work.

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Amendment to the Economic Poisons Article of the Agricultural Code of California (Thallium)

Section 1066. It is unlawful to sell any adulterated or misbranded economic poison.

This amendment (A.B. 708, Ch. 952, Stats. 1943) in revising the provisions with regard to thallium, removes the obsolete provisions from Section 1066, and incorporates reworded provisions into a new Section 1066.5 as follows:

Section 1066.5. As used in this section "thallium" includes any preparation of thallium or of the salts thereof.

It is unlawful for any person to sell or to possess thallium except that:

(a) Federal, State, county, or municipal officers or employees, in their official capacities, or persons under the immediate supervision of such officers or employees, may possess thallium for use for pest control purposes.

(b) Licensed physicians, surgeons, pharmacists, or veterinaries may possess thallium for use in their respective professions.

(c) Persons operating research or chemical laboratories may possess thallium for use for the purposes of such laboratories.

(d) Registered manufacturers of ant poison may manufacture and sell, and registered dealers in ant poison may possess for sale and sell, ant poisons containing not more than 1 per cent of thallium, expressed as metallic, prepared, packaged, and sold in accordance with such rules and regulations as the director may deem necessary to protect the public health.

(e) Wholesalers or jobbers of economic poison may possess for sale or sell thallium to any person included within the above classifications, or for export.

Rules and regulations to which reference is made in paragraph (d) have not yet been promulgated, and in advance will be the subject of conference among the Bureau, the industry, and toxicological and other experts whose aid may be required.

Note: Assembly Bill 1238 relating to coloration of arsenicals and fluorides passed both houses of the legislature, but lacked the signature of the governor within the required time to become law.

Note: Two amendments of the Business and Professions Code are of interest to some economic poisons registrants. Both Section 5a of the Poison Law and Section 4045 of the Pharmacy Law (A.B. 707, 708 and A.B. 1335, Chs. 348,952 and 977 respectively, Stats. 1943) administered by the State Board of Pharmacy, 515 Van Ness Avenue, San Francisco, have been amended to permit sale by dealers generally of ant poisons containing arsenic expressed as metallic not more than 0.40% when registered as economic poisons. Ant poisons containing more than this may be sold only by registered pharmacists. The former limit was 0.2%. ALL ant poisons are economic poisons, and require registration with the Bureau of Chemistry before being offered for sale in California.

Note: It seemed desirable to clarify the fact that economic poisons except as specifically included in the Poison Law would be exempt from the poison schedules of said law. Accordingly there was added a sentence to Section 4 thereof, as follows: "No schedule adopted by or under the provisions of this act shall apply, except as herein specifically provided, to any economic poison as defined in Section 1061 of the Agricultural Code." (A.B. 1335, Ch. 977, Stats. 1943)

Note: The revised Agricultural Code is being printed but excerpts with the most recent revisions will not be ready for distribution for some time.

—*Dr. Alvin J. Cox,*
Chief, Bureau of Chemistry.

Bureau of Chemistry Announcement No. EP-29 —Dated July 22, 1943.

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Write for Bulletin FBB 1242

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Additional Patents Relating to Pest Control

By DR. R. C. ROARK.

2,318,201 (May 4, 1943; appl. Dec. 2, 1941). **Mothproofing Composition.** Wallace Colman and Herbert L. J. Haller, Washington, D.C.—Claude R. Wickard, as Secretary of Agriculture of the United States of America and to his successors in office.—A mothproofing agent comprises isonitrosoacetanilide.

2,318,634 (May 11, 1943; appl. Apr. 26, 1941). **Fly Trap.** David H. Robinot, New York, and Alex Weil, Jamaica, N. Y.

2,318,968 (May 11, 1943; appl. May 6, 1941). **Acridinium Azo Compounds.** Frederick Proescher, San Jose, and Vladimir M. Sycheff, Palo Alto, Calif.—Research Corporation, New York, N. Y.—These azo compounds display bactericidal action.

2,319,034 (May 11, 1943; appl. July 17, 1941). **Sanitary Apparatus.** Robert F. Bracke, Arlington Heights, Ill.—R. F. Bracke & Company, Chicago, Ill.—This apparatus is designed for compelling a person to disinfect the hands.

2,320,077 (May 25, 1943; appl. May 25, 1942). **Ant Poison Container.** Elbin C. Hansen, Los Angeles, Calif.—This container is an improvement over the one described in U. S. Patent 1,540,621, issued June 2, 1925.

Pest Control: A Wartime Necessity Themes War Emergency Meeting and Eleventh Annual Business Session of the National Pest Control Association, Inc., Hotel Statler, St. Louis, Mo., October 25, 26 and 27, 1943

(Continued from page 7)

Conrad C. Johnson will cover the subject of "Fumigation for the Home Front."

Bartlett W. Eldredge will preside at the "Fumigation" clinic. The evening will be given over to a "Round Table Discussion on Moths and Carpet Beetles" with J. Edwin Sameth, presiding.

Wednesday, final day of the three-day meeting, will find William O. Buettner speaking on "The NPCA and Legislation", followed by John Buxell who will discuss "St. Louis Legislation with Reference to the PCO." There will also be a "Termite Control Clinic", with Bert Lewis presiding, and with Ira Hatfield talking on "Research Tests" in connection therewith, and Dr. Thomas E. Snyder on "Termite Control Program." The "Roach Clinic" will be presided over by Dr. George L. Gould. A business session will also be held at which, among other things, annual election of officers and directors will take place. A dinner is scheduled for the evening, with J. Allman Denning as the speaker.

It is urged that preliminary registration be made now so as to assure adequate facilities for all who are planning to attend. Members of the NPCA have received a form with Service Letter No. 301 to be filled out and returned to the Secretary's office, together with registration fee, which this year will be $12.50 and $7.50 for the ladies accompanying their husbands. . . .Non-members are cordially invited to attend the War Emergency Meeting. Those who are so planning are urged to get in touch with the Secretary's office, 3019 Ft. Hamilton Parkway, Brooklyn, N. Y., at their earliest opportunity.

Flying Cockroaches' Challenge Stirs Bronx, N. Y. to All-Out War

A nightly invasion of the Bronx by a sizeable force of two-inch flying cockroaches led to an official investigation yesterday preparatory to a counter-attack to exterminate the pests which for the last two weeks have terrified women, children and mild-mannered men.

The Rev. Joseph Assmuth, professor of zoology and entomology at Fordham University, definitely identified the enemies of the Bronx as members of the cockroach family, belonging to the blatta species.

Their formidable length of two inches is propelled through the air by scaly wings and over the ground by six long, hairy legs. Their course is directed by sensitive antennae.

Father Assmuth reported they would eat virtually anything in sight, being particularly fond of paper, and advised residents not to leave important paper lying within their reach. He said they were not disease carriers and not dangerous. "If they bit you," he assured the Bronx populace, "it will only be a little nip."

Bronx Borough President, Lyons, and his staff, on the basis of reports from inspectors, decided that the pests were lurking in the 600 miles of sewers that run beneath the streets of the Bronx. A study of their habits led to the belief that they fly only at night, when it is cool, and withdraw to their hiding places during the day.

—*N. Y. Herald-Tribune.*

Murine Typhus Fever Increase, Rodent Plague Upswing Noted

Excerpt from talk by Thomas Parran, Surgeon General, United States Public Health Service, presented to the Forty-First Annual Conference of the U. S. Public Health Service with the State and Territorial Health Officers, Washington, D. C., March 24, 1943. Ed.

A substantial increase in murine typhus fever has been noted throughout the South Atlantic seaboard States. During 1942, more than 3,700 cases were reported, an increase of 1,000 over the previous year. The actual number of cases, however, is known to be much higher than indicated by official reports. In some places, 4 or 5 cases have been discovered for each one reported. While there appears to be no cause for general alarm over the typhus situation, the increase in the rates during the last 10 years, and especially during the last year, indicates that more aggressive rodent control is needed in the endemic areas.

There is also evidence that rodent plague is on the upswing in the western States. Plague control units operating in the endemic regions are experiencing less difficulty than formerly in finding infected animals and parasitic vectors. Control measures have been instituted in several areas used for military training and field maneuvers. The most disturbing fact about rodent plague is its appearance in centers of population. Formerly, infection was limited to sparsely settled regions where the possibility of transmission to human beings was not great. Now, however, infected rats and fleas are being found with increasing frequency in and around Tacoma, Wash. It is likely that infection was introduced from rats on ships, but another possibility is that the disease has spread from woodland rodents to the urban rats. While no human cases have yet occurred in the Puget Sound area, this may be because winter conditions have kept the flea index at a very low level. With warmer weather, there may be a different story to tell. The situation is being watched closely, and control measures are being carried out.

INSECTS STAGE AN INVASION

Lower Manhattan Visted in Night by Swarms of Pests

New York.—Hordes of tiny pale-green winged insects invaded lower Manhattan tonight swarming over the area in such dense clouds that one police official flicking them off his uniform, set their figure categorically at "about eight drillion."

—*K. C. Star.*

WHAT'S NEW IN PEST CONTROL-PERSONALS

Correction: The birth day of Theodore Charles Buettner, son of Helen and Bill, was incorrectly reported in August Pests (p. 18) as June 11. It should have read July 11.

CLOCKS STOPPED

On occasions it may be found after fumigation that the clocks in the house have stopped. This may happen particularly when a heavy dosage of gas has been used and a long exposure given. The phenomenon may be due to some physical action between the gas and the lubricating oil in the clocks, causing the oil to become somewhat heavy and thus slowing up or stopping the clocks. There is no permanent damage done to the clocks, however, and the remedy is simple —the clocks should either be removed before fumigation or, if that is not done and the clocks have stopped, it is only necessary to take them to a jeweler and have him clean and re-oil them.

—Discord News Bulletin.

We've often wondered about that, too: There's a little mystery to this better mousetrap business, according to John Kieran, in the N. Y. Sun, the saying was credited to Ralph Waldo Emerson by popular vote—he set down the general idea, if not the exact article (the mousetrap), in a paragraph in his Journal in 1855—but there are those who hold out for Fra Elbertus Hubbard. The debate is somewhat academic. From 1855 to the moment of going to press there has been no newspaper account of the world or any considerable part of it, en masse beating a path to the door of a maker of better mousetraps. Can it be that no better mousetrap has been made in nearly a century?

We have had some wars, some great men (including visitors to this country), some notable athletes, some astonishing inventions, some great fires and a few race riots, all of which caused large crowds to gather But not once since 1855, here or abroad, did the police report state: "Traffic jam caused by crowd beating path to door of maker of a better mousetrap."

BULLIS FEVER—A new disease entity, hitherto undescribed, apparently transmitted by a tick, is reported in the current issue of the Journal of the American Medical Association by Col. John C. Woodland, Major Mordecai M. McDowell and Capt. John T. Richards of the Army Medical Corps, States the N. Y. Times. The new disease, which they name "Bullis fever," was first noticed in a group of soldiers who had been on maneuvers at Camp Bullis, a military reservation about twenty miles west of Fort Sam Houston, Texas. All of the cases had been bitten by a species of tick, commonly called the Lone Star tick because of the star-shaped marking on its back. While the Army physicians do not hazard a guess as to the cause of the new disease, they believe that further investigation will show that it is transmitted to man through tick bites. In many ways Bullis fever resembles other acute feverish illnesses. Outstanding clinical features include severe headache, inflammation of the lymph glands, unusually low white blood cell count, and high fever.

Powdered sabadilla seed, of which the annual importation is about 300,000 pounds from Mexico and South America, is used as an insecticide for lice and roaches. Tests at the University of Wisconsin indicate that when processed as a spray it may effectively replace pyrethrum, which was largely imported from Japan. A variety of sabadilla which grows as a weed in Texas may also be used in the spray.

RABBIT REPELLANT

As a rabbit repellant, Joseph W. Putnam of Grand Rapids, a fruit grower, recommends spraying with a weak lime-pepper solution, using half a pound of pepper to five gallons of water for fruit trees and half that strength for leafy vegetables. The spray is not poisonous and can be removed by washing.

—Ceed World.

TIRE SAVING—Tires wear out as much as four times as fast at sixty-five miles an hour as at thirty-five miles, and speed is the most important factor determining the rate of wear, according to the study, which was conducted by the Public Roads Administration and Iowa State College.

POST WAR INSECTICIDES...

No one can predict how long the war will last, what conditions will prevail immediately thereafter, or what further new developments will occur in the meantime.

However, there are three points on which we can be so definite as to practically remove them from the field of prophecy to that of certainty.

1. Insecticides will be different, more varied, better suited to the specific purposes for which they will be recommended and more effective.

2. Pyrethrum may be substituted by other insecticides for some purposes but in general, it will remain unchallenged in regard to its two great advantages—rapid action on insects and freedom from toxitis to people. Its use will increase, not diminish.

3. D & O will maintain the leadership in the field which they have established in the last two years.

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CONTROLLING PESTS OF WAR GARDENS

By Neely Turner and James G. Horsfall. 19 pages. Illus. April, 1943. Cir. 155.

Pest control in the home garden aims at the maximum production of food. Many vegetables are not usually seriously injured by pests, and in the case of many others certain cultural practices aid in avoiding injury. Disease-free seed should be planted. Some pests are almost certain to be present every year, and these can be controlled by the proper use of insecticides and fungicides.

At a Cabinet meeting in Vichy Pierre Laval observed that one of his councilors, a professor of the University of Paris, nonchalantly drew forth first his handkerchief, then an offensive-looking pipe, and then an even shabbier tobacco pouch, ranging these objects on the table before him.

Laval, aghast at this lack of etiquette, exclaimed, "But, Monsieur, you empty your pockets!"

Whereupon the savant retorted, "Isn't that better than if I filled them?"

TOOTHACHE RELIEF—A paste containing 33 per cent sodium fluoride has shown promising results in relieving toothache due to exposed dentin, common cause of dental pain, it is reported to the American Dental Association by Drs. William H. Hoyt and Basil G. Bibby of Boston, according to Wm. L. Laurence in the N. Y. Times. "After short treatments," they say, "teeth that had caused trouble for years ceased to be sensitive." Use of the chemical was first suggested by Dr. E. H. Lukomsky of the First Moscow State Medical Institute. The treatment, it was added, has also been used successfully in relieving pain in sensitive areas caused by preparing cavities for filling. The cavity is first soaked with two weak solutions of the sodium fluoride before the 33 per cent paste is applied, otherwise the application of the paste causes intense pain and a sensation of extreme cold for a short time. No logical explanation can be offered yet as to why sodium fluoride has this remarkable effect and, since it is a toxic drug, dentists are warned to use the treatment with caution pending further study.

In Lille an audacious little street arab stopped a German officer to ask him the time.

"Twenty minutes to twelve," the German answered politely.

"Okay," said the boy, "if it's twenty minutes to twelve, then at twelve sharp you can go jump in the lake." After which the lad tore down the street with the Nazi at his heels. Rounding a corner too sharply, the German ran into a gendarme.

"That ragamuffin told me that at twelve sharp I could go jump in the lake," he panted. The gendarme calmly studied his watch.

"Well, what's your rush?" he said. "You still have twenty minutes."

Hindsight

"If the trees in the backyards had been sprayed in the middle of July, and again two weeks later," a Park Dept. release on the Brooklyn caterpillar menace said accusingly today, "these insects could have been controlled."

The release adds not too hopefully that a spray solution of five pounds of arsenate of lead to 100 gallons of water might help, providing the trees have not been entirely defoliated.

—N. Y. Post.

Insecticidal Plants Are Grown in India

Several useful insecticidal plants can be grown in India, according to a report to the Commerce Department, and possibilities of their cultivation are being considered. Demand for rotenone insecticides was formerly met chiefly by derris imported from the Netherland East Indies and from the Philippines. Investigations have shown that other plants having the same toxic content as derris are available in India and that they are rich enough in toxic material for use in insecticidal sprays and powders.

Certain parts of India have been found also to possess the proper soil and climatic conditions for the cultivation of Malayan derris. Experiments with growing the plant are reported to have been successful in Mysore, Cochin, and Assam.

—American Chemical Society.

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There is a definite reason why so many Pest Control Operators prefer to use Acme Gas Masks and Canisters in their fumigation work. As proven in actual working conditions, these operators know that the Acme No. 4 Gas Mask will provide Non-Distorted FULL VISION to all sides, thereby enabling them to see their work clearly and increasing their speed of operation.

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Directions for Destroying House Mice

Prepared in the Division of Predator and Rodent Control, Chicago, Ill.

Trapping

HOUSE MICE in the home, on a small farm, or in a business establishment may often be kept under control by trapping. The small wooden base snap traps and a small all-metal snap trap now on the market give good results. Their low cost makes it practicable to set a dozen or more so **use plenty.** Rebait and reset all traps each evening and place them in such manner that the mice will pass over the trigger in following their natural runways along walls, behind objects, or wherever partial concealment is afforded. Traps are most effective when set near the garbage pail, in the pantry, kitchen, or cellar, or wherever a mouse is likely to be attracted by food.

Fresh bait is essential and preferably should be tied to the trigger of the trap. Fresh bread, cake, and doughnuts are dependable baits, but these should be varied with others, as peanut butter, chocolate candy, cheese, fried bacon, sardines, apple parings, nut meats, or bananas. Rolled oats, flour, or other cereal may be sprinkled lightly over the traps as an additional attraction.

It is frequently possible to use the small wooden base trap without any food bait by making a "trial set". To do this, the first procedure is to enlarge the small trigger by cutting a piece of corrugated boxing cardboard the size to fit inside the square wire loop of the trap and then slipping this cardboard section onto the trigger. The resulting platform provides a much larger trigger surface. This modified trap is placed in a mouse runway with the trigger at right angles to the wall or other solid object. An inspection every day or so to remove any dead mice and to keep the trap set is sufficient.

Poisoning

For the control of mice on a larger scale, poisoning is sometimes necessary. Two kinds of lethal baits may be used, depending on the location and local conditions. One is a stable poisoned bait that will remain effective for a long period of time, and the other is a fresh bait to be prepared with a poison and used at once.

Stable baits.—The use of lethal baits is often desired for the protection of property in homes or camps that are used periodically and shut up for part of the year; also in certain other kinds of buildings. Three lethal baits are suggested:

(1) A simple method of preparation is to mix one-eighth ounce of powdered strychnine alkaloid with an equal quantity of baking soda and stir thoroughly in 1 quart of rolled oats or corn meal. For use on a small scale.

(2) Mix 1 tablespoonful of gloss starch in one-fourth teacupful of cold water and stir into three-fourths pint of boiling water to make a thin clear paste. Mix 1 ounce of powdered strychnine alkaloid with 1 ounce of baking soda and stir into the starch to

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a smooth creamy mass free of lumps. Stir in one-half pint of heavy corn syrup and 1 tablespoonful of glycerin or petrolatum. Apply to 10 pounds of milo maize or canary seed and mix thoroughly to coat each kernel. Spread on paper to dry. The canary seed, or bird seed (Phalaris canariensis), can usually be obtained from bird dealers or seed stores and the maize from feed stores. For use on an extensive scale.

Lethal baits thus prepared will last indefinitely when kept in a dry place. They may be placed in small, covered boxes that have one or two holes in each side, slightly larger than 25-cent pieces. These holes allow the mice to enter the box but should be cut high enough from the floor to prevent the scattering of the bait material outside the box. The boxes are effective when left in places frequented by the rodents. They provide a permanent poison supply that is available to the mice at all times, without some of the dangers of scattered mouse bait. Such containers should be **marked plainly** with red paint, "POISON". Care should be taken to make them inaccessible to children, irresponsible persons, or domestic animals. All utensils used in preparing lethal baits should be washed thoroughly or destroyed.

Fresh baits.—For immediate use there are some fresh bait materials with which certain poisons may be mixed. A few formulas are given.

(1) Dice apples or sweet potatoes into one-half inch cubes. Dust 20 ounces of either bait material, while stirring gently, with one-eighth ounce of powdered strychnine alkaloid. Other poisons may be substituted for the strychnine. Powdered zinc phosphide may be used in the same proportion and manner.

(2) If there are no household pets (dogs or cats) to be endangered, hamburger, or a mixture of 2 parts ground bacon and 6 parts of a blend of ground dried bread crumbs and cake crumbs, may be used as bait materials. One ounce of zinc phosphide, or 2 ounces of arsenic trioxide, may be mixed with 10 pounds of one of these bait materials.

Fresh baits prepared with zinc phosphide do not remain effective very long, varying from 2 days to a week, but generally as long as the baits remain acceptable. In dry or oily baits the zinc phosphide retains its toxicity for several months if kept in a dry place and in tight containers. Fresh baits should be exposed in places readily accessible to mice for quick detection of the bait is desired.

Cats As Mousers

House cats are sometimes effective in removing mice and may be stimulated to increased effort by reducing their supply of other food. However, good mousers may be destructive of bird life if allowed freedom, and should be kept shut up during the birdnesting season.

Repelling Mice

Certain odors and substances are obnoxious to mice and are of value, therefore, in repelling them from stored products. Flake naphthalene is one of the most effective of the deterrents and when scattered over and around bags of seeds, overstuffed furniture, books, clothing, and other articles may protect them effectively from mouse depredations. Inasmuch as naphthalene becomes dissipated in the air with time, repeated applications are often necessary. Because of its odor it is not advisable to use naphthalene to repel mice from foodstuffs. Powdered sulphur and also

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lime have been used successfully in protecting such stored grain as corn and sheaf oats.

Where foodstuffs are not involved and it would be suitable to use certain materials as sprays, there are several compounds that may be suggested, such as kerosene, creosote, blackleaf 40 or nicotine sulphate, and also spray emulsions containing copper oleate, or copper carbonate, or lime-sulphur. Oils of peppermint and of wintergreen, also tung oil, are repellents to mice. Insulating materials such as sawdust, ground paper and the like, may be protected from mice by the addition of ammonium sulphate.

—*United States Department of the Interior Fish and Wildlife Service. Wildlife Leaflet* 234

FLEET OF BUGS HITS NEW YORK'S EAST SIDE

A sudden attack on the lower East Side by large formations of tiny green flying bugs appeared to have abated today, residents reported.

No one could positively identify them, except to say they looked like "green snow," but it was thought the insects were probably aphids. The Clinton St. police station, receiving many complaints, couldn't figure out what to do.

—*N. Y. Post.*

LOCAL ORGANIZATION NEWS

Los Angeles District

The July Los Angeles District meeting was held at the Masonic Temple in Long Beach with a very good attendance, with the good will ambassador from South America, who gave a very interesting talk and kept the PCO's in an uproar of laughter. During the meeting two new members were added to the Los Angeles District of the Pest Control Operators of California, Inc., making 105 members in the Los Angeles district.

State Structural Pest Control Board Hold Meeting in Sacramento

The annual meeting of the State Structural Pest Board was held in the State Capitol, Sacramento, July 20, 1943. All members of the Board, Registrar, and members of the Department were present. Directors of the Department of Professional and Vocational Standards, Mr. Percy C. Heckendorf, and his assistant, Mr. Fred Taylor, attended the meeting and outlined the war-time policy of the State Government to the Board.

A review of previous years' development was studied and a policy outlined for the coming year. Much time during the past year had been spent in reorganizing material, examinations, questions, and qualifications for applicants for pest control licenses.

The annual election was held in which the following were elected to office for the coming year: Mr. David G. Rennie, president, and Mr. John H. Coald, vice-president. The chairmen of committees will be announced shortly. Mr. E. O. Corson of Berkeley, retiring president, was given a most welcome and enthusiastic praise for his untiring effort put forth during the past year.

Half A Century With The Successful Argentine Ant

(Continued from page 12)

upon sweets, a bait of arsenic and a sugary material was naturally suggested. That the bait method of control is not a new one is revealed by Roark[14], who quotes Worlidge ("System Agricultural, the Mystery of Husbandry Discovered," 1669) as follows:

Also you may make boxes of Cards or Pasteboard pierced full of holes with a bodkin, into which boxes put the powder of Arsenick mingled with a little Honey. Hang these boxes on the tree, and they will destroy them, make not the holes so large that a Bee may not enter lest it destroy them.

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Newell[15], of the U. S. Bureau of Entomology, first pronounced the following important consideration in the control of the Argentine ant, namely, that the poison must be

> one which will destroy larvae and workers, as well as queens, within the colony. To meet this requirement the poison must be fatal but must act so slowly when contained within the insect stomach that it will not kill the foraging workers ere they can transport it to the nest and there deliver it to other members of the colony.

He had but indifferent success with a mixture of lead arsenate and sugar and honey, and lead arsenate and honey alone. He was also one of the first to announce the repellent effect of arsenical sirups, and with reference to this, states, "Our experiments have shown that solutions of sugar or molasses containing a small percentage of arsenic can be used to 'drive' the ants from a room which the foragers persist in visiting." He moreover suggested the use of one of the first weak arsenical solutions, namely, "White arsenic, ½ gram; cane sugar, 20 grams; water, 100 cc."

At this same time, Newell notes that C. P. Lounsbury, entomologist of the Department of Agriculture at Cape Town, South Africa, succeeded "in repelling the Argentine ants from residences there by the use of very similar mixtures. Those most frequently used by Professor Lounsbury are Cooper's dip and Golden Syrup, equal parts, and a mixture of marmalade, sugar and arsenite of soda." Here mention is made for the first time of the use of sodium arsenite, the key to the control problem.

In 1905, Titus discovered the Argentine ant in Ontario, California. Two or three years later, Woodworth, of the University of California, visited Louisiana, where he studied Newell's work on the Argentine ant. In 1910, in Bulletin 207 of the California Agricultural Experiment Station, Woodworth recommended reducing the arsenic between ¼ to ⅛ of 1 per cent, but he did not state what form of arsenic he used. Nickels,[16] who worked with Woodworth, stated he used ¼ to ⅛ per cent sodium arsenite in a sugar sirup. Thus it was Woodworth who definitely recommended for the first time the use of a weak solution of sodium arsenite.

Wilmon and Newell, in 1913, once again emphasized the fact that sweetened arsenical mixtures act as repellents, and were driving the colonies away instead of exterminating them.

In 1916, Barber, of the U. S. Bureau of Entomology, improved Woodworth's formula by reducing the amount of arsenic in solution. W. E. Cross, a chemist in the Sugar Experiment Station in Louisiana who worked with Barber on the ant sirup, was largely responsible for the preparation of the poison which subsequently was called the Government Argentine ant formula. He made a careful study of the chemical aspects of the ant sirup and was the one to suggest that

> the addition of a small quantity of tartaric acid to the sugar sirup before adding the sodium arsenite will produce a greater inversion of the sucrose, thus lessening the danger of crystallization and will neutralize the alkalinity of the sodium arsenite, preventing decomposition. If a slight acid reaction is obtained the sirup will keep indefinitely.

R. S. Woglum and A. D. Borden[17] modified the Barber-Cross formula by reducing the amount of sugar and increasing the amount of honey. This resulted in a further reduction of crystallization in the sirup. The poison bait was kept from fermenting too quickly through the addition of benzoate of soda. And with this contribution we have the Government Argentine ant formula which with slight modifications is in use today.

In 1924 Smith[18] and other members of the Mississippi State Plant Board succeeded, with the use of the Government Argentine ant formula, in exterminating an infestation of the ant from 1½ blocks in Fayette, Mississippi. This was the first town in the world from which the Argentine ant had been eradicated. Smith in 1936 disclosed that other towns in Mississippi had succeeded in eradicating the pests. In these instances the poisoned arsenical sirup actually exterminated rather than merely repelled the ant.

In many areas of California, particularly where intensive control is undertaken in citrus orchards, great reduction of the ant results. In other areas, control with the Government Argentine ant formula is extremely slow, and during the summer, is apparently non-existent. In such localities the ant sirup is placed around the home, where it is used as a "bribe" to inveigle the ant into feeding **outside** the house.

The greatest innovation in the control of the Argentine ant since the advent of the Government formula was the introduction of thallous sulfate (commercially called thallium sulfate) as the toxic ingredient in the ant sirup. Any individual who has used the arsenical and the thallous formulas soon becomes cognizant of the much greater effectiveness of the thallous sulfate sirup. The reasons for this increased effectiveness have not been investigated, but it is believed to be due to the fact that the Argentine ant "takes" better to the poison, and that the poison acts more quickly upon it. According to H. Hartnack,[19] a pest control operator in Chicago, he suggested the use of thallous sulfate as an ant poison to C. H. Popenoe, and with the latter evolved a formula for the control of Pharaoh's ant, **Monomorium pharaonis** (L.). Popenoe[20] published a note on this, and the sirup was subsequent-

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ly used in the control of the Argentine ant. Some states prohibit the use of thallous sulfate, since it has no simple antidote.

Reasons for the Success of the Argentine Ant

What are some of the factors that have lifted this hexapod alien from the ranks of obscurity to public prominence as "Ant No. 1"?

(1) Unlike ants of most other species, the Argentine ants, even from widely separated colonies, are friendly to one another. The queens are likewise so.

(2) In an infested area it will be found that the widely separated runways of the ants eventually anastamose. Moreover, there are a great number of queens in an infested area who have a high reproductive potential. As a consequence there arises an enormous number of individuals, with resultant huge and powerful colonies.

(3) The ant is extremely adaptable, and nests in a great variety of situations.

(4) There is usually no dearth of food for the omnivorous worker. The worker, moreover, is persistent, courageous and tenacious. These qualities plus their great numbers result in the defeat of practically every insect that opposes them.

The female is not a mere egg-laying machine, but partakes in the grooming and feeding of the young. Almost always she mates in the nest and is therefore not subject to the perils that attend the mating flight of other species of ants. The mated female can initiate a new colony merely by walking off with a following of workers.

(6) There is no important natural enemy of the ant in the United States.

(7) Finally, they are readily distributed through natural and man-made facilities.

With apologies to Aesop and with the kind permission of the reader, may we moralize that the traits responsible for the great success of the Argentine ant in this country are almost identical with those qualities so prominent in our outstanding bipedal immigrants. These qualities are adaptability, courage, persistence and the capacity to cooperate. Fortunately for man, this ant is lacking in one prominent characteristic, intelligence!

[1]E. Foster, Jour. Econ. Entom., 1: 289-293, 1908.
[2]Iridiomyrmex pruinosus Roger var. humilis Mayr.
[3]W. Newell, Jour. Econ. Entom., 1: 21-34, 1908.
[4]E. R. Barber, U.S.D.A. Bull. 377, 1916.
[5]C. Lyle, Jour. Econ. Entom., 29: 965-967, 1936.
[6]W. Newell and T. C. Barber, U.S.D.A. Bur. Entom. Bull. 122, 1-98, 1913.
[7]J. R. Horton, U.S.D.A. Bull. 647, 1918.
[8]C. W. Woodworth, Calif. Agr. Exp. Sta. Bull. 207, 1910.
[9]L. Hertzer, Ann. Ent. Soc. Amer., 23: 601-609, 1930.
[10]M. R. Smith, U.S.D.A. Circ. 387, 1936.
[11]E. S. G. Titus, U.S.D.A. Bur. Ent. Bull. 52:78-84, 1905.
[12]F. B. Herbert, Jour. Econ. Entom., 25: 832-833, 1932.
[13] R. E. Hackley, Pests, 8: 16-17, 1940.
[14]R. C. Roark, Soap, 11: 101, 1935.
[15]W. Newell, Jour. Econ. Entom., 2: 174—192, 1909.
[16]L. J. Nickels, Jour. Econ. Entom., 4: 353-358, 1911.
[17]R. S. Woglum and A. D. Borden, U.S.D.A.
[18]M. R. Smith, Jour. Econ. Entom., 17: 603-604, 1924.
[19]H. Hartnack, "202 Common Household Pests," 182-183, 1939.
[20]C. H. Popenoe, Science, 64: 525, 1926.

Reprinted from The Scientific Monthly, Vol. LV, pages 536-545.

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GAS—HOT OR COLD?

Bulletin discusses the question which arises occasionally as to the advantage of a "hot" gas over "cold" gas, the hot gas being represented as hydrocyanic acid generated by the pot method and the cold gas being represented by the "canned" product, for example in the form of Zyklon Discoids. Bulletin also contains some helpful notes on gas mask canisters and bedbugs.

WRITE PESTS, A-C-68.

BELLOWS

New-type bellows, made of materials non-essential to war effort, described in circular. Manufacturer states though no springs are used in the bellows they can be operated with one hand. They contain no valves and are quick-filling through the opening in the nozzle. Available in sizes for professional and resale purposes.

WRITE PESTS—CENTRO.

THE ACTIVATING EFFORT OF PYRETHRUM UPON THE GERMAN COCKROACH

Research material prepared by John M. Hutzel, of the Ohio State University, Columbus, Ohio in cooperation with the Kenya Pyrethrum Extension Service, Inc., N. Y. Supervised by Professor F. L. Campbell.

WRITE PESTS—PYRETHRUM.

TERMITE CONTROL

Folder discusses concentrates available for two distinct methods of termite control: (1) treatment of timbers in place with an oil solution, and (2) treatment of all soil around an infested building or area with either an oil or water soluble chemical. Issuing company states it specializes in all problems concerning wood-destroying organisms and also wood preservation and invites your inquiries thereto.

WRITE PESTS—WOOD.

FUMIGATION SAFETY SUGGESTIONS

Of timely interest, in view of the at-hand fumigation season, is this bulletin which advocates as a safety measure the use of methyl orange-mercuric chloride test papers for the presence of HCN. It also discusses can openers for Zyklon Discoids, the need for adequate ventilation after fumigations, and gives a cautionary note on pilot lights in premises to be fumigated.

WRITE PESTS—AMERICAN.

FUMIGATION NOTES:

Discusses spread of Discoids; reinfestation; effects on vegetables and eggs.

WRITE PESTS, AC58.

Sodium Fluoride (95%)

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BLOOMFIELD, N. J.

FUMIGATION AND PLASTICS

News release discusses use-co-ordination of such diverse chemical products as plastics and fumigants in connection with infested bagged grain, seed, packaged or boxed foodstuffs. Methyl bromide-plastic-tarpaulin method of disinfestation described.

WRITE PESTS—DOW

HOUSEHOLD SPRAY FACTS

Manufacturer's bulletin discusses Lethane's killing power, range of insect control, cost, chemical stability, spray formulas, etc.

WRITE PESTS—ROHM & HAAS.

PYRETHRUM - DERRIS - RED SQUILL PRODUCTS

Leaflet describes foregoing insecticides with special bait chart for use in connection with powdered red squill.

WRITE PESTS—PRENTISS.

SOLVAY PRODUCTS

48-page booklet in colors and illustrated, covering their entire line of Alkalies and Special Products, with a special section dealing with Para-Dichlorobenzene and Ortho-Dichlorobenzene.

FREE COPY MAY BE HAD BY PEST CONTROL OPERATORS. WRITE SOLVAY, c/o PESTS.

DEODORANT

Catalog includes price data, etc., on deodorant which it is felt can neutralize and deodorize such toxic agents as Thanite, Lethane 384 Special, Velsicol, etc. Also contains data on perfume oils for sprays made with pyrethrum and kerosene.

WRITE PESTS—MAGNUS.

PIGEON-PROOFING

Folder describes pigeon-proofing invention which manufacturer claims will completely and decisively eliminate the pigeon nuisance. In use by real estate companies, churches, government buildings, etc.

WRITE PESTS—STANLEY.

SODIUM SILICO FLUORIDE

Bulletin describes sodium silico fluoride product with proper density. Effective manner of testing for presence of HCN after ventilation also discussed.

WRITE PESTS—AC 70.

RECHARGEABLE STORAGE FLASHLIGHT BATTERIES

Literature describes permanent type of rechargeable flashlight battery which eliminates worry about a dry cell shortage, due to the use of critical materials, and can, it is stated, equal in use as many as 400 or more dry cells. Instead of constantly using new cells and throwing them away, you simply recharge the battery and it's "just like new" again, manufacturer states. The addition of a few drops of distilled water and regular charging is all that is necessary for an unlimited amount of bright, steady light.

WRITE PESTS—IDEAL.

ELECTRIC FANS

Bulletin discusses value of electric fans in connection with fumigation work, also some pertinent thoughts on the Schafer Prone Pressure Method of Resuscitation, etc.

WRITE PESTS—AC-69.

MOLE KILLER PELLETS

Circular describes mole killer pellets which manufacturer states requires no traps, no gas, no exposed poison. Diagram of runways and explains how mole lives. Testimonial letters.

WRITE PESTS—CARAJON.

STERILIZING GAS MASKS

News bulletin describes a chemical that is claimed by the manufacturer to be effective in sterilization of gas masks. Bulletin also discusses antidotes and first aid, particularly an inhalant which functions best as an antidote to HCN poisoning, and where obtainable.

WRITE PESTS—A-C-73

BOX CAR FUMIGATION

Folder describes box car fumigation with methyl bromide, giving details as to: car seal, applicator arrangement, methyl bromide application, dosage, exposure period, temperature, aeration, precautions.

WRITE PESTS—DOW

Yesterday a woman came to the N. Y. office of the OPA and demanded to see the regional director, Sylvan Joseph. She was insistent about seeing him. "I have a rent problem," she related. "In March of last year, when all rents were frozen, I lived in a nice apartment. No, they're not raising my rent now. They want me to renew, at the same rent. But since March, 1942, roaches are in the apartment. What'll I do?" . . . "That's easy," she was advised. "Charge 'em rent."

—From "The Lyons Den," N. Y. Post.

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The book is not one of formulas alone, but is written in a crisp and intensely interesting explanatory fashion which enhances its value to any private or industrial library. The fact that many practicing chemists engaged in one field of work are not familiar with the formulas in another field, and that much study and practice must go into compiling unfamiliar formulas makes this volume a ready source book of information.

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